

WHAT IS CLAIMED IS:

1 1. A foam composition comprising:

2 a fibrous material including microspheres interspersed
3 within the fibrous material forming a part of the structure of
4 the foam.

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6 2. A composition comprising:

7 a microsphere component comprising a microsphere selected
8 from the group consisting of a glass, a silica-alumina
9 ceramic, an epoxy resin, an unsaturated polyester resin, a
10 silicone resin, a phenolic, a polyvinyl alcohol, a polyvinyl
11 chloride, a polypropylene, a polystyrene, a polyacrylonitrile,
12 a polyimide, an amino resin, and any combination thereof;
13 and

14 a fibrous component surrounding at least one of said
15 microspheres.

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17 3. The composition of claim 2, wherein the microsphere
18 component comprises a combination of expanded and non-
19 expanded microspheres.

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21 4. The composition of claim 2, wherein the microsphere is a
22 polyacrylonitrile (PAN).

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24 5. The composition of claim 4, wherein the PAN microspheres
25 are a combination of expanded and non-expanded
26 microspheres.

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28 6. The composition of claim 2, wherein the microsphere is a
29 polyvinyl chloride (PVC).

7. The composition of claim 2, wherein the fibrous component comprises aramid fibers, carbon fibers, glass fibers, or any combination thereof.

8. The composition of claim 2, wherein the composition comprises a fibrous component from about 2-15% by weight.

9. The composition of claim 8, wherein the fibrous component comprises about 10% by weight fiber.

10. The composition of claim 2, wherein the microsphere component comprises polyacrylonitrile (PAN) and the fiber component comprises polyester fibers, aramid fibers, glass fibers, or a combination thereof.

11. The composition of claim 2, wherein the microsphere component comprises polyvinyl chloride (PVC) and the fiber component comprises polyester fibers, aramid fibers, glass fibers, or a combination thereof.

12. A fibrous-reinforced foam made by a method comprising:
contacting a fibrous material with a microsphere component under conditions such that the microsphere component infiltrates the fibers of the fibrous component to generate a mixture; and

heating the mixture under conditions such that the microspheres expand.

13. The fibrous-reinforced foam of claim 12, wherein the mixture is expanded by applying a heat to a mold comprising the mixture.

63 14. The fibrous-reinforced foam of claim 12, wherein the
64 conditions comprise vibrating the mixture.

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66 15. The fibrous-reinforced foam of claim 12, wherein the
67 microsphere component comprises a combination of expanded and
68 non-expanded microspheres.

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70 16. The fibrous-reinforced foam of claim 12, wherein the
71 microsphere component comprises polyacrylonitrile (PAN)
72 microspheres.

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74 17. The fibrous-reinforced foam of claim 16, wherein the PAN
75 microspheres are a combination of expanded and non-expanded
76 microspheres.

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78 18. The fibrous-reinforced foam of claim 12, wherein the
79 microsphere component comprise polyvinyl chloride (PVC)
80 microspheres.

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82 19. The fibrous-reinforced foam of claim 12, wherein the
83 fibrous component comprises aramid and/or glass fibers.

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85 20. The fibrous-reinforced foam of claim 12, wherein the
86 mixture comprises a fibrous component from about 2-15% by
87 weight.

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89 21. The fibrous-reinforced foam of claim 20, wherein the
90 mixture comprises a fibrous component of about 10% by weight.

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92 22. The fibrous-reinforced foam of claim 12, wherein the
93 microsphere component comprises polyacrylonitrile (PAN) and

the fiber component comprises polyester fibers, aramid fibers, glass fibers, or a combination thereof.

23. The fibrous-reinforced foam of claim 12, wherein the microsphere component comprises polyvinyl chloride (PVC) and the fiber component comprises polyester fibers, aramid fibers, glass fibers, or a combination thereof.

24. A method of making a fibrous-reinforced foam, comprising:
mixing a microsphere component with a fiber component in a closed mold;
vibrating the closed mold under conditions the cause the microspheres to infiltrate the fibrous matrix of the fiber component;
heating the mold to expand the microspheres and fuse them together; and
allowing the mixture to cool.